

IN THE DRAWINGS

Claim 5 has now been amended such that all of the elements of the claim appear in the drawings.

REMARKS

Claim rejections – 35 USC §102

The examiner has rejected claims 1,2 and 4-6 as being anticipated by U.S. 6,732,762 to Russel. Based upon the following arguments, and in light of the attached claim amendments, it is believed that the claims are novel over Russel.

Russel discloses a plug locking mechanism in which a latch dog 40 is raised into a locking position inside a female recess or notch 182 in the wall of the pipe. Russel itself, at 1/38 et seq, describes that this type of locking mechanism is to be distinguished from the “wedge type” locking mechanism employing the friction forces caused by a slip that is forced into the side of the pipe wall by the interaction of sliding surfaces, such as the present invention. This difference in locking technique is important, since the locking mechanism of Russel requires precise placement in a specific location, using installation tools, whereas the “wedge-type” locking mechanism can be located anywhere along the pipe and can be activated remotely.

While it is true that the latch dog 40 of Russel is raised into the locking position by the interaction of a sliding surface on latch dog 40 sliding along a sliding surface of a conical force ring 20, this sliding action occurs in a single, uniform motion since the angles of the two sliding surfaces are the same. In Russel, there is no two-stage “jumping action”, as is the case in the present invention, where a first sliding angle of relatively high degree causes the latch dog to be displaced relatively quickly in the radial direction, followed thereafter by a continued sliding action of relatively smaller degree that imparts the wedging forces. In Russel, a single sliding angle brings latch dog 40 into locking position, where it then rests upon a surface parallel to the longitudinal bore. The examiner states that, “Col 7, lines 50-56 discloses that when the conical force ring (20) is shifted from either position...[the] surfaces of both the latch slips and the conical force ring serve as wedging ramps to guide and/or compel the slips to move radially outward”. This statement is simply an uncontroversial description of a wedge action. This statement does not imply however, the *two-stage* wedge action of the present invention.

Amended claim 1 is believed therefore to distinguish the present invention over Russel. First, claim 1 now specifies that the slips are provided with 2 different sliding surfaces of differing gradients, namely a front (20, 23) and a sliding surface (21, 21') having different angles. It is these two different gradients that allows for the two-stage “jumping” action of the slips that permits the plug to set with significantly reduced longitudinal travelling-distance of the slips. It is respectfully argued that Russel does not disclose features permitting this two-staged “jumping” action.

In addition, claim 1 has now been amended to distinguish the present “wedge-type” locking mechanism that employs wedging forces from the “latch dog-type” locking mechanism of Russel. Amended claim 1 now specifies that slips 15, when in the gripping position, are in abutment with a surface of the conical force ring that is other than parallel with the longitudinal bore (as is the case in Russel).

The dependent claims contain further limitations related to the two different sliding gradients not present in Russel, such as the presence of the two different angles on the conical force ring,

the gradients being further specified as being a first steep gradient and a second, relatively small gradient, and the features of a slip recess and force ring recess.

Claim rejections – 35 USC § 103

Claim 3 has been rejected as being unpatentable over Russel in view of U.S. 3,943,982 to Lecordier. Lecordier is cited because it allegedly discloses a front surface having a steep gradient and a sliding surface having a smaller gradient. The applicant respectfully disagrees with this characterization of Lecordier, as discussed below.

Applicant agrees that Lecordier discloses a plug where the locking mechanism travels along a surface not parallel to the longitudinal axis of the passage. In this respect, Lecordier represents a “wedge-type” locking means that has more in common with the present invention than the “latch dog-type” locking mechanism of Russel.

Lecordier does not however disclose a two-stage sliding mechanism. As is apparent from Fig 2 of Lecordier, slip (7) travels along a sliding surface having a single, uniform gradient, just as is the case with Russel. The only difference between Lecordier and Russel is that, instead of coming to rest on a parallel surface, the slip of Lecordier remains on the sloping sliding surface in order to impart the friction forces by wedging action, as is inherent in wedge-type locking mechanisms. Lecordier specifically does not disclose that the slip travels along two different gradients from the retracted position to the locking position as is the case with the present invention. No feature from Lecordier, when combined with Russel, would result in slips that first travel along a slope of high gradient, and thereafter a slope a smaller gradient.

There is in fact no incentive in the respective disclosures to suggest combining features from Lecordier with Russel, since Russel does not rely on wedging forces for its locking action. The latch dog from Russel must simply be raised into locking position by a single motion...it is completely unnecessary for Russel to have the second, smaller gradient, since that smaller gradient is present precisely to impart a wedging force that Russel does not use.

Furthermore, the locking means of Lecordier are moved along the conical surface by the pretension of springs, when a latch has released the locking means, and not by hydraulic means. The “front surface” of the slip is in Lecordier only used to interact with outer ends of latches to hold the slips in a retracted position and not at all as a gliding surface to move the slips from a retracted to an extended position. The other technical features of the present invention are not found in this publication.

The applicant therefore respectfully submits that the technical solution according to the present invention will not be within the reach of a skilled person with the knowledge of these two publications. The latch dog solution as described in Russel is so far away from the wedge locking element as described in Lecordier and neither of these publications give any indications to come up with a solution as the present invention, neither do they try to solve the same problem as the present invention, to have a larger radial movement of the slip elements from a retracted position to a position wherein they may grip and hold the plug relative to the pipeline wall.

CONCLUSION

Base upon the foregoing, it is believed that the attached set of claims are in a condition for allowance, and favourable reconsideration is solicited.

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